

Article

The Green Black Box: Environmental-Transition Targets and Deal-Value Transparency in Korean Cross-Border Acquisitions

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Abstract

Firms can use cross-border mergers and acquisitions (M&As) to obtain technologies and capabilities needed for environmental transition, yet the values of these transactions may be difficult for outside stakeholders to observe. This study examines the relationship between environmental-transition activity relevance and deal-value transparency using 209 completed acquisitions by Korean listed firms from 2016 to 2020. We identify transition-relevant targets through a prespecified activity-name crosswalk based on the Korean Green Taxonomy. The screen classifies 18 targets as transition-relevant, including three explicit environmental activities and 15 activities requiring project-level technical review. This measure captures activity relevance only and does not indicate taxonomy alignment or environmental performance. The classification shows substantial agreement with the alternative LSEG Energy and Power or Materials sector screen (Cohen's $\kappa = 0.669$; 14 overlapping cases). Deal values were reported for 139 of 140 domestic transactions but for only 38 of 69 cross-border transactions. Given this pronounced imbalance, we employ Firth penalized logistic regression. Cross-border status is consistently associated with a lower likelihood of deal-value reporting, including in models that control for lagged acquirer size, profitability, and leverage obtained from OpenDART. Within the cross-border subsample, transition relevance is negatively associated with deal-value reporting in the baseline model, but the relationship weakens after financial controls are included. The findings therefore reveal a robust cross-border transparency gap, whereas the evidence concerning environmental-transition targets remains suggestive and sensitive to measurement and model specification. Boards and regulators should strengthen valuation documentation and governance oversight in cross-border acquisitions and use taxonomy-based screens as due-diligence tools rather than as evidence of ESG performance.

Keywords: environmental transition; deal-value disclosure; cross-border acquisitions; transaction governance; information asymmetry; mergers and acquisitions; Korea



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1. Introduction

Corporate sustainability becomes economically meaningful when firms commit capital, reorganize assets, and accept new transition risks. Mergers and acquisitions (M&A) provide a consequential setting because they can transfer technologies, production capacity, and organizational capabilities more quickly than internal development. Research links corporate sustainability and social responsibility to organizational processes, financial outcomes, and acquisition performance [1–4], but it remains difficult to observe how environmental considerations enter an individual transaction.

A central governance question is whether stakeholders receive enough information to evaluate those commitments. Disclosure can reduce information asymmetry and support valuation, yet it can also reveal bargaining positions, proprietary knowledge, and strategic priorities [5–10]. The tension is particularly strong in cross-border M&A, where legal distance, due-diligence complexity, and heterogeneous reporting regimes increase uncertainty [11,12]. A transaction can therefore be strategically important and simultaneously difficult for outside investors to assess.

Prior empirical ESG-M&A research primarily examines acquirer ESG, ESG distance, deal completion, acquisition performance, or post-deal environmental outcomes [13–22], while acquisition-disclosure research emphasizes enforcement, target significance, private-target information, and reporting quality [22–28]. These streams have not directly tested whether target-sector transition exposure is associated with the disclosure of deal value within a common home-country reporting environment. This unresolved transaction-governance question is distinct from asking whether an acquisition improves ESG performance.

This study addresses that gap using 209 completed domestic and cross-border acquisitions by Korean listed acquirers during 2016–2020. It asks whether cross-border status, private-target status, technological intensity, and official-taxonomy activity relevance are associated with the decision to disclose transaction value. Deal-value disclosure is observable for every transaction and provides a narrow but verifiable governance outcome. The analysis is descriptive and associational; it does not identify a causal disclosure effect.

The environmental construct is deliberately limited. A prespecified crosswalk searches the archived target name and LSEG activity fields for activity families listed in the Korean Green Taxonomy: explicit environmental activities are separated from steel, cement, basic chemicals, fossil-energy, shipping, and mining activities that require technical screening. The indicator therefore identifies environmental-transition relevance, not taxonomy alignment. It is not an ESG score, does not identify environmental virtue, and does not measure emissions or post-acquisition performance. This distinction responds to evidence that ESG measures disagree when they capture different scopes and attributes [29–32].

The study makes three contributions. First, it documents a large cross-border transparency gap that remains after lagged acquirer financial controls. Second, it separates environmental-transition activity relevance from ESG performance and validates the screen against an official taxonomy, the earlier LSEG sector rule, and complete case-level audits. Third, it reports the boundary of the environmental result: activity relevance has a negative but imprecise association with disclosure among foreign deals, and the estimate weakens after acquirer controls. This combination of a robust governance finding and a bounded environmental finding offers a more credible account than a specification selected for statistical significance.

2. Literature Review and Hypotheses

2.1. Environmental-Transition Exposure as a Transaction Attribute

M&A can reallocate resources and improve capabilities when an acquirer obtains assets that would be costly to develop internally [33,34]. Sustainability-related technologies, materials, and energy assets may provide strategic options, but they can also impose transition risk, integration cost, and uncertain future cash flows. More broadly, acquisition outcomes vary substantially with deal characteristics and integration conditions [35–40]. Environmental exposure should therefore be treated as a transaction attribute whose strategic value and information demands may differ across settings, not as an inherently beneficial label.

The sustainable-finance literature reinforces this measurement boundary. ESG performance can be associated with value, risk, and investor decisions [41–45], while sustainability

reporting remains institutionally heterogeneous and multidimensional [46–50]. Recent studies connect green knowledge, ESG distance, carbon risk, and green acquisitions to corporate investment and M&A outcomes [13–22,51]. Their mixed findings imply that environmental content can matter without producing a uniform performance effect.

2.2. Disclosure, Proprietary Costs, and Target Observability

Disclosure theory predicts that firms release information when capital-market and governance benefits exceed proprietary costs [5,8]. Deal value is informative because it reveals part of the acquirer's valuation and bargaining outcome. At the same time, disclosure can expose strategic priorities or target-specific information. Evidence from acquisition filings, private targets, going-private transactions, and deal timing shows that enforcement, target significance, reporting quality, and information availability shape acquisition disclosure and outcomes [22–28].

Private and high-technology targets intensify these trade-offs. Private targets provide less standardized public information, and technology-intensive targets often derive value from intangible assets and proprietary knowledge. Opaqueness and valuation uncertainty can affect both transaction completion and target valuation [52,53]. Recent evidence also shows that private, high-technology, and foreign targets weaken the alignment between announcement valuations and post-acquisition performance through target information asymmetry [54]. Korean evidence further shows that target listing effects vary with target-country growth uncertainty in cross-border acquisitions [55], while target listing status, acquirer size, and diversification jointly shape value creation in Korean SME acquisitions [56]. Accordingly, target observability is expected to matter even after accounting for whether a transaction is domestic or foreign.

2.3. Cross-Border Information Frictions

Cross-border acquisitions span different legal, accounting, and stakeholder regimes. Institutional differences affect completion, performance, and location choice, while sustainability policies, cross-country distance, and global-value-chain position alter international acquisition incentives [11–21,57–61]. These differences increase the cost of evaluating target quality and may strengthen incentives to keep strategically sensitive deal terms confidential.

Sustainability information can reduce uncertainty when it is credible and assured, but it can also become less informative when ratings and standards disagree [29,30,62–65]. Investor demand for climate information is substantial [66,67], and equilibrium models show that sustainable preferences can influence prices and portfolio choice [68,69]. At the transaction level, however, the relevant question is narrower: whether the environmental exposure of the acquired asset is accompanied by verifiable disclosure of the consideration paid.

2.4. Hypotheses and Research Question

Cross-border complexity raises both information asymmetry and the proprietary cost of revealing deal-specific valuations. Prior evidence shows that institutional distance affects acquisition completion and performance [11,57,59–61], while enforcement and transaction-specific information shape acquisition disclosure [22–28]. Together with disclosure theory [5,8], this evidence motivates the broad international disclosure prediction.

Hypothesis 1. *Cross-border acquisitions are less likely than domestic acquisitions to disclose deal value.*

Transition-exposed targets may combine regulated assets, commodity sensitivity, technological options, and uncertain transition pathways. Contemporary studies link ESG distance, emissions policy, carbon risk, and green acquisitions to M&A structure, comple-

tion, valuation, and performance, but report mixed effects across settings [14,16,18–22]. These uncertainties can make valuation more strategically sensitive, especially in foreign transactions, without implying that exposed targets have superior ESG performance.

Hypothesis 2. *Within cross-border acquisitions, targets with environmental-transition-relevant activities are less likely to have deal value disclosed.*

Target observability generates two additional predictions. Private-target studies document sparse target and deal information and show that reporting quality and target information affect investor assessment and deal timing [24,25,27,28].

Hypothesis 3. *Acquisitions of private targets are less likely to disclose deal value.*

High-technology targets contain more intangible and proprietary assets, making their value difficult to verify from public information. Evidence that private, high-technology, and foreign targets increase M&A information asymmetry provides a direct empirical basis for the fourth prediction [53,54]. Related Korean evidence shows that high-technology M&A performance depends on the technological orientation of both sides and on organizational maturity [70], reinforcing the need to distinguish target classification from acquirer capacity.

Hypothesis 4. *Acquisitions of high-technology targets are less likely to disclose deal value.*

Finally, we ask whether disclosed cross-border deals remain larger after controlling for acquirer financial characteristics. Because value is observed only when disclosed, this analysis is explicitly conditional and is treated as a research question rather than a causal hypothesis.

3. Materials and Methods

3.1. Data and Sample

The transaction data are drawn from project-specific extracts of the licensed LSEG Mergers and Acquisitions Deals Database (retrieved on 26 March 2024; official product website: <https://www.lseg.com/en/data-analytics/financial-data/deals-data/mergers-and-acquisitions-deals-database>) and archived for this analysis. The domestic extract is restricted to observations with Cross Border Deal Flag = False, and the foreign extract supplies the cross-border sample. Both files are limited to transactions announced during 2016–2020 and completed by the end of 2020; five transactions completed in 2021 are excluded. SDC Deal No is the unique deal identifier, and foreign-flagged records appearing in the domestic workbook are not appended, preventing cross-file duplication. These rules yield 209 unique transactions with no duplicate deal IDs: 140 domestic and 69 cross-border. The deals are associated with 174 distinct acquirer ticker codes.

Korea provides a useful single-home-country research design rather than a claim of global representativeness. Restricting acquirers to Korean listed firms holds the home-country reporting environment constant while permitting a within-setting comparison of domestic and foreign targets. OpenDART also permits lagged, deal-matched financial controls for Korean listed acquirers [71]. This design improves comparability but does not establish that the same disclosure gap applies in other reporting regimes.

Lagged acquirer financial data are collected from the Financial Supervisory Service's OpenDART system [71]. For each transaction, total assets, return on assets, and leverage are measured for the fiscal year immediately preceding the announcement. Total assets are available for 179 deals, including 62 of 69 cross-border deals. Target-country regulatory quality and rule of law are obtained from the World Bank Worldwide Governance Indicators

(WGI), 2025 Revision (coverage: 1996–2024) [72], and are matched by target country and announcement year for all 69 foreign deals. Deal-to-financial and deal-to-country joins are validated as many-to-one; core transaction variables are not imputed, and financial-control models use complete cases.

Table 1 summarizes the sample composition by completion year.

Table 1. Sample composition by completion year.

Year	Domestic	Cross-Border	Total
2016	22	11	33
2017	21	17	38
2018	33	17	50
2019	29	13	42
2020	35	11	46
Total	140	69	209

Notes: The unit of observation is a completed acquisition. The sample includes Korean listed acquirers and transactions completed by 2020.

3.2. Variable Construction

Deal-value disclosure equals one when LSEG classifies a transaction as Disclosed Value and Disclosed Dollar Value Deal and reports a positive transaction value, and zero when it classifies the transaction as Undisclosed Value. Across both source workbooks, the two categorical fields agree exactly with the presence of a positive transaction value. The outcome therefore follows an explicit LSEG disclosure classification rather than treating any populated numeric field as disclosure; however, the data do not independently identify the originating issuer filing or exclude collection from other public sources. Transaction-specific disclosure and target information are central outcomes and mechanisms in prior acquisition research [22–28]. The conditional value outcome is the natural logarithm of deal value in USD millions and is defined only for disclosed transactions. Cross-border equals one when the target country differs from Korea. Private-target status comes from the LSEG target-public-status field, diversification from the LSEG deal-classification field, and high-technology status from the LSEG target high-technology classification. These variables capture target observability, strategic relatedness, and intangible-asset uncertainty rather than ESG performance [24,25,27,28,35,36,40,54].

Environmental-transition activity relevance is the primary environmental variable. We encoded activity families from the official Korean Green Taxonomy and applied the same deterministic regular-expression rules to target names, NAICS descriptions, SIC descriptions, LSEG industry descriptions, and target-sector fields [73]. The 2022 K-Taxonomy is applied retrospectively as a transparent coding framework; it does not imply that acquirers used the taxonomy when the transactions were undertaken. Explicit environmental activities (renewable energy, grid/storage, pollution or water control, and zero-emission transport) are distinguished from activities that the taxonomy recognizes only after technical screening (steel, cement, basic chemicals, fossil-energy or power, shipping, and mining). The screen identifies 18 transactions: 10 domestic and 8 foreign. Three are explicit activity-name matches and 15 require technical screening. Because the data contain neither project thresholds nor do-no-significant-harm and minimum-safeguard evidence, the variable is activity-relevant, not taxonomy-aligned. The Climate Bonds Taxonomy 2018 provides contemporaneous cross-taxonomy context for the same broad activity families [74], while the IFRS climate-disclosure framework independently identifies energy and materials among climate-exposed industry groups [75].

Construct validation uses two prespecified comparisons. First, the taxonomy screen is compared with the alternative LSEG Energy and Power or Materials sector screen. Fourteen cases are positive under both measures, four are taxonomy-screen positive outside those sectors, and eight LSEG-sector cases lack an activity-name match. Overall agreement is 94.3%, Cohen's kappa is 0.669, and the association is strong (Fisher exact odds ratio = 80.1, $p < 0.001$). Second, all 35 U.S. targets and 13 European targets are automatically compared with pre-deal EPA GHGRP and EEA E-PRTR facility or parent names using normalized exact, containment, and dual fuzzy-score thresholds [76,77]. No candidate passes the prespecified threshold. These zero matches are retained as unknown rather than recoded as non-emitters. Appendix A reports each positive case's matched source field and exact matched text; a conservative sensitivity excludes the one case with a clear target-unit versus industry-field conflict.

The primary acquirer controls are log total assets, ROA, and leverage, all measured before announcement. They address observable differences in organizational scale, profitability, and capital structure but do not eliminate omitted-variable concerns. WGI regulatory quality and rule of law are entered in separate foreign-sample specifications because they are highly related measures of the target-country institutional environment. No missing financial value is imputed; the controlled results are explicitly interpreted as complete-case estimates.

3.3. Empirical Strategy

The primary outcome is deal-value disclosure. Conventional maximum-likelihood logit is poorly suited to the sample because 139 of 140 domestic transactions disclose value, producing near-separation. We therefore estimate Firth penalized logistic regression, which reduces first-order maximum-likelihood bias and yields finite estimates under separation [78,79], with completion-year indicators. The primary model includes cross-border status, official-taxonomy activity relevance, their interaction, private-target status, diversification, and target high-technology status. A second specification adds lagged OpenDART financial controls.

The cross-border subsample is estimated separately with Firth logit. Construct sensitivity is evaluated by repeating the same models with (i) the 22-case alternative LSEG Energy and Power or Materials sector screen and (ii) the 14-case intersection between the taxonomy and LSEG screens. Supplementary Tables S1–S6 report WGI controls, U.S.-exclusion, explicit-versus-technical components, the conservative 17-case screen, an acquirer-clustered linear-probability model, leave-one-country-out estimates, and target-selection models. Clustering follows standard dependence-aware guidance [80]. Each check addresses a named threat: target-country institutions, dominant-country composition, acquirer confounding, construct breadth, dependence, or influential countries.

Conditional deal-value models use OLS with acquirer-clustered standard errors and completion-year indicators. These models are not selection-corrected because the data provide no credible exclusion restriction for disclosure. Their estimand is the association with value among disclosed deals, not the value of the full transaction population.

3.4. Interpretation and Decision Rules

The study is associational. H1 is considered robust only if cross-border status remains negative in baseline and DART-controlled Firth specifications and in the acquirer-clustered linear-probability model. H2 is supported only if activity relevance remains negative and statistically precise after acquirer controls and across both construct sensitivities. H3 and H4 are evaluated in the same baseline and DART-controlled disclosure models. Secondary p -values are interpreted cautiously because multiple related specifications are reported.

Figure 1 summarizes the research workflow, hypothesis-to-model mapping, and interpretation boundaries.

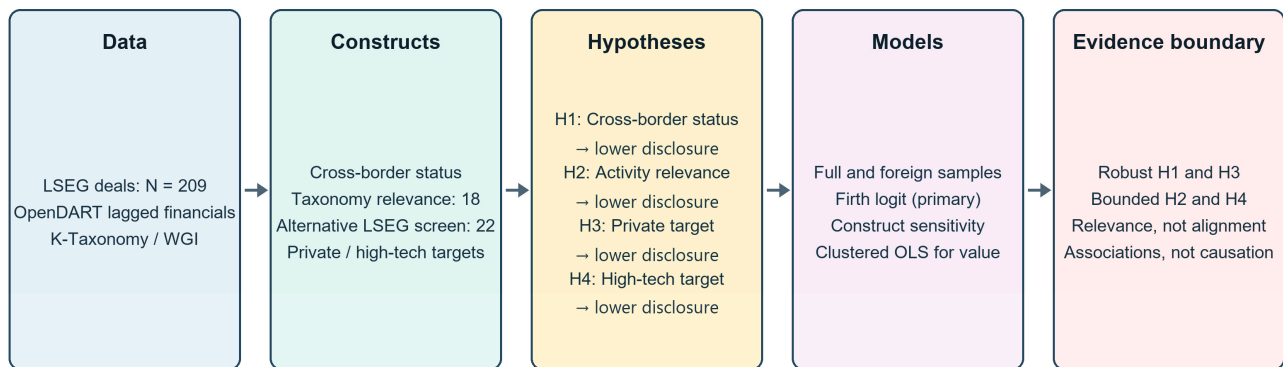


Figure 1. Research workflow, hypothesis-to-model map, and interpretation boundary.

4. Results

4.1. Descriptive Evidence

Table 2 shows that official-taxonomy activity-relevant targets account for 7.1% of domestic deals and 11.6% of cross-border deals; this difference is not statistically significant (two-sided Fisher exact $p = 0.301$). Deal-value disclosure differs sharply: 139 of 140 domestic deals disclose value, compared with 38 of 69 cross-border deals (55.1%; Fisher exact $p < 0.001$). Among foreign deals, value is disclosed for two of eight activity-relevant targets and 36 of 61 other targets (Fisher exact $p = 0.127$). The small positive cell motivates penalized estimation and restrained interpretation.

Table 2. Descriptive statistics by transaction type.

Variable	Domestic	Cross-Border	All
Official-taxonomy activity relevant	0.071 (10/140)	0.116 (8/69)	0.086 (18/209)
Alternative LSEG sector screen	0.100 (14/140)	0.116 (8/69)	0.105 (22/209)
Private target	0.643 (90/140)	0.391 (27/69)	0.560 (117/209)
Diversifying transaction	0.407 (57/140)	0.449 (31/69)	0.421 (88/209)
High-technology target	0.243 (34/140)	0.333 (23/69)	0.273 (57/209)
Deal value disclosed	0.993 (139/140)	0.551 (38/69)	0.847 (177/209)
Deal value (USD millions)	53.933 (296.298; N = 139)	355.580 (1320.358; N = 38)	118.693 (671.390; N = 177)
Log acquirer assets	25.356 (1.346; N = 117)	29.479 (2.680; N = 62)	26.784 (2.741; N = 179)
ROA	−0.052 (0.456; N = 117)	0.025 (0.086; N = 62)	−0.025 (0.374; N = 179)
Leverage	0.389 (0.250; N = 117)	0.439 (0.186; N = 62)	0.406 (0.231; N = 179)

Notes: Binary variables report mean and count of ones/N in parentheses. Continuous variables report mean, standard deviation, and available N in parentheses. Deal-value statistics use disclosed observations; DART variables use available lagged financial statements.

Disclosed cross-border transactions are larger on average than disclosed domestic transactions (USD 355.6 million versus USD 53.9 million), but both distributions are right-skewed. The corresponding medians are USD 65.1 million and USD 10.6 million. Acquirer size is also higher in several foreign transactions, which makes the lagged DART controls important for the conditional value comparison.

4.2. Primary Deal-Value Disclosure Models

Table 3 presents the primary disclosure-model estimates.

Table 3. Deal-value disclosure models and construct sensitivity.

Variable	Taxonomy Baseline	Taxonomy + DART	LSEG Baseline	LSEG + DART
Cross-border	−4.761 *** (0.923)	−3.765 *** (1.010)	−4.592 *** (0.900)	−3.632 *** (0.992)
Environmental activity relevance	−2.500 (1.727)	−3.372 * (1.723)	−1.353 (1.655)	−0.971 (1.823)
Cross-border × environmental	0.532 (1.923)	1.804 (1.930)	−0.410 (1.904)	−0.118 (2.076)
Private target	−1.587 ** (0.640)	−1.591 ** (0.673)	−1.561 ** (0.635)	−1.507 ** (0.669)
Diversifying	−0.783 (0.557)	−0.556 (0.613)	−0.662 (0.542)	−0.441 (0.594)
High-technology target	−1.352 ** (0.604)	−1.006 (0.670)	−1.297 ** (0.592)	−0.888 (0.658)
Log assets	-	−0.254 ** (0.125)	-	−0.230 * (0.121)
ROA	-	−0.511 (0.858)	-	−1.271 (0.994)
Leverage	-	1.617 (1.561)	-	1.405 (1.570)
Year fixed effects	Yes	Yes	Yes	Yes
Observations	209	179	209	179

Notes: Firth logit coefficients with standard errors in parentheses. Columns 1–2 use the official-taxonomy activity screen; Columns 3–4 use the alternative LSEG Energy and Power or Materials sector screen. All models include completion-year indicators. DART controls are measured before announcement. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

The cross-border coefficient is -4.761 ($p < 0.001$) in the primary baseline model, corresponding to an odds ratio of 0.009. After DART controls, it remains at -3.765 (odds ratio = 0.023, $p < 0.001$). H1 is therefore supported. The comparable LSEG-screen estimates are also negative and precise, so the governance conclusion does not depend on the environmental classification.

Activity relevance has a negative main effect in the primary models (-2.500 , $p = 0.148$; -3.372 , $p = 0.050$ after DART controls), but the cross-border interactions are not precise ($p = 0.782$ and $p = 0.350$). H2 is not supported in the full-sample interaction design. The LSEG-screen columns reach the same substantive conclusion.

Private-target status is negative in the primary baseline (coefficient = -1.587 , odds ratio = 0.205, $p = 0.013$) and DART-controlled model (coefficient = -1.591 , odds ratio = 0.204, $p = 0.018$), supporting H3. High-technology status is negative in the baseline (coefficient = -1.352 , odds ratio = 0.259, $p = 0.025$) but attenuates after financial controls ($p = 0.133$). H4 is therefore supported only in the baseline specification.

In the DART-controlled disclosure model, log assets is negatively associated with disclosure (coefficient = -0.254 , $p = 0.043$), whereas ROA and leverage are imprecisely estimated. These control coefficients are secondary correlates rather than causal estimates.

4.3. Cross-Border Subsample and Robustness

Table 4 reports the cross-border subsample results.

Table 4. Firth disclosure models in the cross-border subsample.

Variable	Taxonomy Baseline	Taxonomy + DART	LSEG Baseline	LSEG + DART
Environmental activity relevance	−1.938 * (1.006)	−1.391 (1.033)	−1.693 * (1.026)	−0.876 (1.091)
Private target	−1.639 ** (0.698)	−1.599 ** (0.758)	−1.591 ** (0.688)	−1.530 ** (0.748)
Diversifying	−0.571 (0.620)	−0.382 (0.745)	−0.439 (0.602)	−0.285 (0.730)
High-technology target	−1.579 ** (0.682)	−1.028 (0.767)	−1.501 ** (0.673)	−0.888 (0.764)
Log assets	-	−0.111 (0.160)	-	−0.101 (0.157)
ROA	-	−4.633 (5.836)	-	−5.043 (5.790)
Leverage	-	1.952 (1.961)	-	1.816 (1.961)
Year fixed effects	Yes	Yes	Yes	Yes
Observations	69	62	69	62

Notes: The dependent variable equals one when deal value is disclosed. Standard errors are in parentheses. Columns 1–2 use the official-taxonomy screen; Columns 3–4 use the alternative LSEG Energy and Power or Materials sector screen. All models include completion-year indicators. ** $p < 0.05$, * $p < 0.10$.

Within cross-border deals, official-taxonomy activity relevance has a coefficient of -1.938 (odds ratio = 0.144, $p = 0.054$). It attenuates to -1.391 (odds ratio = 0.249, $p = 0.178$) after DART financial controls. The alternative LSEG Energy and Power or Materials sector screen is likewise negative but attenuates from -1.693 ($p = 0.099$) to -0.876 ($p = 0.422$). The 14-case intersection produces -2.084 ($p = 0.079$) in the baseline and -1.318 ($p = 0.272$) after DART controls. Every construct therefore gives the same direction, but none satisfies the prespecified controlled robustness rule for H2.

Private-target status remains negative and statistically precise in the primary foreign baseline ($p = 0.019$) and DART model ($p = 0.035$). High-technology status is significant in the baseline ($p = 0.021$), but weakens after financial controls. Supplementary Tables S1–S5 report official-taxonomy sensitivities. Activity relevance remains negative with WGI regulatory-quality and rule-of-law controls (-2.007 , $p = 0.047$; -1.936 , $p = 0.052$), but becomes imprecise when U.S. targets are excluded (-2.517 , $p = 0.235$). The explicit and technical components are separately negative but imprecise, and the activity coefficient is negative under every leave-one-country-out exclusion. An acquirer-clustered linear-probability model confirms the cross-border disclosure gap (-0.293 , $p = 0.001$) but not the interaction ($p = 0.344$). These secondary checks do not overturn the attenuation after DART controls.

4.4. Deal Value Conditional on Disclosure

Table 5 presents the conditional deal-value estimates.

Table 5. Log deal value conditional on disclosure.

Variable	Taxonomy Base	Taxonomy + DART
Cross-border	1.174 *** (0.419)	0.566 (0.566)
Environmental activity relevance	−0.022 (0.501)	0.097 (0.528)
Cross-border × environmental	1.010 (0.972)	0.548 (0.722)
Private target	−0.512 (0.336)	−0.542 * (0.311)
Diversifying	0.147 (0.249)	0.482 ** (0.242)
High-technology target	0.353 (0.324)	0.405 (0.321)
Log assets	-	0.343 *** (0.111)
ROA	-	−0.378 (0.416)
Leverage	-	−1.694 ** (0.730)
Year fixed effects	Yes	Yes
Observations	177	147

Notes: OLS coefficients with acquirer-clustered standard errors in parentheses. The sample contains only transactions with disclosed deal value. The DART-controlled model uses 133 acquirer-ticker clusters. All models include completion-year indicators. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

In the primary base conditional-value model, cross-border status has a coefficient of 1.174 ($p = 0.005$), equivalent to approximately 223% higher disclosed value. After DART controls, the coefficient falls to 0.566 and is not statistically significant ($p = 0.317$), while log acquirer assets is positive (0.343, $p = 0.002$). The environmental interaction is insignificant in both specifications. The base cross-border size premium therefore appears to reflect acquirer composition and disclosure selection rather than a robust transition-related valuation effect.

Among the remaining DART-controlled correlates, diversification is positive (0.482, $p = 0.046$), leverage is negative (−1.694, $p = 0.020$), and private-target status is weakly negative (−0.542, $p = 0.081$). These secondary coefficients should be interpreted cautiously because the model is conditional on deal-value disclosure.

4.5. Additional Target-Selection Evidence

A supplementary Firth model of cross-border status shows no association with official-taxonomy activity relevance (coefficient = 0.472, $p = 0.388$; DART-controlled coefficient = 0.182, $p = 0.847$). Private-target status is strongly negative in the base model ($p < 0.001$) but weakens after lagged DART controls, while acquirer size becomes the dominant positive correlate of foreign acquisition. This result reinforces the importance of separating target selection from disclosure behavior. Supplementary Table S6 reports these target-selection estimates.

5. Discussion

5.1. Main Interpretation

The most stable result is a cross-border transparency gap. This finding extends evidence that institutional distance and cross-country frictions shape acquisition completion, location, and performance [11,57,59–61], and that enforcement affects acquisition

disclosure [23]. The present outcome is narrower than the returns or completion outcomes emphasized in those studies: it asks whether the consideration paid is observable. Deal value is almost universally reported for domestic acquisitions but is missing for nearly half of foreign acquisitions, and the gap remains large after lagged acquirer financial controls. Institutional distance, bargaining confidentiality, and target uncertainty are plausible explanations, but the observational design cannot determine which mechanism dominates.

The environmental result is narrower than much of the ESG-M&A literature. Prior studies relate acquirer ESG, ESG distance, emissions policy, carbon risk, and green acquisitions to completion, deal structure, premiums, and post-deal outcomes [13–22]. In contrast, the present activity-relevance coefficient is based on only eight positive foreign deals and weakens after acquirer controls. Its direction is stable across an official-taxonomy screen, the alternative LSEG Energy and Power or Materials sector screen, and their intersection, but its precision is not. This difference is theoretically informative rather than contradictory: activity relevance is not ESG performance, and disagreement across ESG measures cautions against treating any broad label as a stable transaction attribute [29–32].

Private-target status is the most consistent target-level correlate. Its negative association survives the full-sample and foreign DART specifications, aligning with evidence that private-target filings contain sparse information and that reporting quality and target information affect investor responses and deal timing [24,25,27,28]. High-technology status is negative in the baseline but weakens after financial controls. This partial result is consistent with evidence that high-technology targets intensify information asymmetry [54], while showing that the available sample cannot separate that mechanism from acquirer composition.

The conditional-value results also revise the simple descriptive narrative. Prior research links information uncertainty and ESG distance to target valuation and acquisition premiums [14,53,64]. Here, cross-border deals appear much larger when only transaction characteristics are included, but the difference becomes statistically insignificant after acquirer financial controls. Larger Korean acquirers both undertake foreign deals and complete larger disclosed transactions. This does not eliminate a foreign size premium in the population; it shows that the available data cannot separate it from acquirer composition and nonrandom disclosure.

5.2. Theoretical Contribution

The study contributes by separating three concepts often compressed into a single ESG label: environmental-transition relevance of the target activity, information observability of the target, and governance of transaction disclosure. Existing ESG-M&A research primarily evaluates ESG characteristics or acquisition outcomes [13–22], while acquisition-disclosure research emphasizes enforcement and target information [22–28]. Linking these streams at the deal level shows why a taxonomy-screened activity can be transition-relevant without being taxonomy aligned or environmentally superior and why a disclosure outcome is not proof of post-acquisition sustainability performance.

The evidence supports a governance-centered account of sustainable M&A. Cross-border transactions create a general transparency challenge; target opaqueness has a comparatively stable association with disclosure; and transition exposure may add valuation difficulty, but its incremental role is not stable in the present sample. Sustainable strategy and transaction governance should therefore be evaluated jointly but measured separately. This bounded conclusion explains both the consistency with information-asymmetry research and the weaker correspondence with studies that use firm-level ESG performance.

5.3. Managerial and Policy Implications

Boards evaluating foreign acquisitions should require a valuation record that is strong enough to support oversight even when public disclosure is legitimately constrained. For taxonomy-screened targets, the board should document which activity creates transition relevance, whether technical thresholds are met, and whether value derives from regulatory exposure, decarbonization technology, resource access, or conventional operating assets. This discipline reduces the risk that a sustainability narrative substitutes for transaction economics.

Managers can improve decision-useful disclosure without revealing every negotiation detail. Useful practices include reporting valuation ranges, strategic rationale, integration milestones, transition assumptions, and post-deal performance indicators. Regulators should recognize legitimate proprietary costs while maintaining a clear expectation that cross-border and sustainability-related narratives remain tied to verifiable consideration and governance information.

5.4. Limitations and Future Research

The study has six principal limitations. First, the taxonomy crosswalk validates activity-name relevance but cannot test project thresholds, do-no-significant-harm requirements, safeguards, green revenue, patents, or environmental performance. The 2022 K-Taxonomy is applied retrospectively to 2016–2020 transactions as a coding framework, not as evidence of contemporaneous managerial classification. The automated EPA and EEA searches yielded no threshold-passing pre-deal entity matches, so unmatched cases remain unknown rather than non-emitters. One positive case has a clear target-unit versus industry-field conflict; excluding it in a conservative 17-case sensitivity leaves the main inference unchanged. Second, only 18 deals are activity-relevant and only eight are foreign, limiting precision. Third, DART coverage reduces the full sample to 179 and the foreign sample to 62, so coefficient changes combine controls with complete-case selection. Fourth, Korean M&A evidence indicates that ownership concentration and principal conflicts can shape acquisition outcomes [81], yet ownership, acquisition experience, target significance, and acquirer ESG capability remain unobserved potential confounders. Fifth, deal value is missing nonrandomly, preventing unconditional value inference; moreover, the LSEG disclosure classification does not independently identify the originating issuer filing or exclude collection from other public sources. Sixth, the single-home-country design and 2016–2020 period limit generalization to later reporting regimes and other institutions.

Future research should obtain stable facility identifiers, verified emissions, green revenue, environmental patents, or project-level taxonomy documentation; enlarge the foreign sample; and independently code ambiguous targets. A multi-country design could test whether mandatory disclosure and sustainability-reporting regimes moderate the cross-border transparency gap. Post-acquisition analysis could then determine whether activity-relevant acquisitions change environmental performance rather than merely transaction disclosure.

6. Conclusions

This study examines deal-value transparency in Korean M&A using an auditable official-taxonomy activity-relevance screen. In 209 Korean acquisitions, cross-border transactions are substantially less likely to disclose deal value, and the association remains after lagged acquirer financial controls. Private-target status also has a stable negative association with disclosure. High-technology and environmental-activity results are directionally consistent with greater information frictions but are sensitive to controls and small cells.

The main implication is not that taxonomy-screened acquisitions are inherently opaque or environmentally aligned. Rather, foreign acquisition creates a broad governance chal-

lenge, and the available data provide only suggestive evidence that transition-relevant activity adds to it. Credible sustainable M&A research and practice therefore require clear construct boundaries, reproducible coding, project-level verification, and disclosure claims that remain no stronger than the evidence.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su18157648/s1>, Table S1: Cross-border disclosure models with WGI regulatory-quality and rule-of-law controls; Table S2: Cross-border disclosure models excluding U.S. targets; Table S3: Component-specific and conservative-screen sensitivity analyses; Table S4: Acquirer-clustered linear-probability models of deal-value disclosure; Table S5: Leave-one-country-out sensitivity estimates for the cross-border subsample; Table S6: Cross-border target-selection models.

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Appendix A. Official-Taxonomy Activity-Relevance Coding

The primary indicator equals one when an archived target activity field matches a prespecified K-Taxonomy activity family. Explicit environmental activities and technical-screen-required transition activities are kept separate. A positive value establishes activity-name relevance only. Project-level technical criteria, do-no-significant-harm tests, minimum safeguards, emissions, and environmental performance are not observed.

External Criterion Search: Thirty-five U.S. targets were compared with pre-deal EPA GHGRP facility and parent names, and 13 European targets were compared with pre-deal EEA E-PRTR facility names. No candidate passed the prespecified automated matching threshold. No manual override was used, and unmatched cases were not coded as non-emitters.

Construct-Validity Boundary: The official-taxonomy crosswalk, substantial agreement with the independent LSEG sector classification, full 209-case audit, and specification sensitivity support reproducibility and convergent activity relevance. They do not validate project-level taxonomy alignment, transaction-level emissions, green revenue, patents, or environmental performance. Researchers should not relabel the measure as ESG performance or environmental improvement without additional data.

Table A1. Complete audit of official-taxonomy activity-relevant targets.

Deal ID	Target	Country	Tier	Activity Family	Value Disclosed
3574664040	EM Index Co., Ltd.	South Korea	Technical screen	basic_chemicals	Yes
3474713040	Ecoline-Asset Debt Contracts Personnel	South Korea	Explicit	pollution_or_water_control	Yes
3001641040	HLB Networks Co., Ltd.	South Korea	Technical screen	shipping	Yes
3079280040	Hyundai Heavy Industries Co., Ltd.-Medical Robot Business	South Korea	Technical screen	steel; shipping	Yes
2929423040	Hyunjin Materials Co., Ltd.-Equipment	South Korea	Technical screen	steel	Yes
3008581040	KOREA CEMENT Co., Ltd.	South Korea	Technical screen	cement	Yes
3459227040	LG Chem Ltd-MF Membrane Production Facilities	South Korea	Technical screen	basic_chemicals	Yes
3465230040	Lake Materials Co., Ltd.	South Korea	Technical screen	basic_chemicals	Yes
3601923040	PK Windpower Co., Ltd.	South Korea	Technical screen	fossil_or_power	Yes
3180314040	UST Co., Ltd.	South Korea	Technical screen	steel	Yes
3249231040	Galaxy Resources Ltd-Northern Salar del Hombre Muerto	Argentina	Technical screen	mining	Yes
3131605020	ACT Independent Turbo Services Inc.	United States	Explicit	pollution_or_water_control	No
3266995020	AMPAC Fine Chemicals LLC	United States	Technical screen	basic_chemicals	No
3048508020	Laguna Tubular Products Corp	United States	Technical screen	steel	No
3226840020	Longfellow Nemaha LLC	United States	Technical screen	fossil_or_power	No
3203464020	Nu-World Corp	United States	Technical screen	basic_chemicals	Yes
3316682020	Parker Hannifin Corp-Energy Grid Tie Division	United States	Explicit	renewable_grid_or_storage	No
3622134040	Vina Polytech Co., Ltd.	Vietnam	Technical screen	basic_chemicals	No

Notes: The table contains all 18 positive cases. Technical-screen cases are not claimed to be taxonomy-aligned. Deal IDs reconcile directly to the processed transaction file.

Table A2. Concordance between the alternative LSEG Energy and Power or Materials sector screen and official-taxonomy activity relevance.

Alternative LSEG Sector Screen	Taxonomy Negative	Taxonomy Positive	Total
Negative	183	4	187
Positive	8	14	22
Total	191	18	209

Notes: Overall agreement = 94.3%; Cohen's kappa = 0.669; Fisher exact odds ratio = 80.1, $p < 0.001$. Agreement supports convergent relevance, not taxonomy alignment or environmental performance.

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